

Improved Junction Box

Cross Reference to Related Application

This application is a Continuation-in-Part of United States Patent Application, Serial No.

- 5 10/004129, filed 1 November 2001, the disclosure of which is incorporated herein to the extent necessary for a complete enabling disclosure of the present invention.

Background of the Invention

Field of the invention

10 This invention is in the field of protective enclosures for electrical wiring (i.e., junction boxes). More particularly, this invention relates to a non-conductive junction box for electrical wiring and related electrical components. Junction boxes are generally manufactured and supplied to the trade in industry-standard sizes and configurations. Some conventional junction boxes are made entirely or partially of conductive metallic material, but increasingly the 15 electrical trade, and especially some particular applications such as electrical wiring in wet environments, call for junction boxes that are formed entirely of non-conductive materials.

Related Technology

20 Generally, electrical wiring terminations and electrical components are installed within protective junction boxes in both residential and industrial environments. Typically, such electrical components and wiring terminations must be installed into and attached to a junction box so as to provide proper spacing between components, to provide environmental protection to the wiring terminations and components, and to prevent inadvertent contact with the wiring and components, for example, by people or animals. An important consideration is that a junction 25 box be as spacious inside as is practicable for a particular size class in order to provide adequate room for the wiring terminations, and also be very flexible in the methods allowed for routing wires and conduits to and from the junction box.

Another consideration with junction boxes is the size or sizes of electrical conduits that are to be connected with the junction box. Conventional junction boxes generally allow only a 30 single size of electrical conduit to be connected to a particular junction box. Some junction

boxes will accept connection of a couple of different sizes of electrical conduits, or require the use of adapters or reducer bushings to facilitate connection of more than one or two different sizes of electrical conduits. Consequently, installers of electrical junction boxes and wiring must carry to job sites a great multitude of different sizes and configurations of conventional junction

5 boxes so that they can be sure of having what they need for a particular job.

Over the years there have been many types of electrical junction boxes developed, some for specialized usage and others for more generalized purposes, often with a view to both low cost of manufacture and to economy of use. The main purposes of such junction boxes have been to provide environmental protection for wiring terminations and electrical components installed in the boxes, while also preventing inadvertent contact by humans and animals with this wiring and electrical components.

Junction boxes have been designed in many and varying shapes and sizes, but have these above-described conventional considerations and functions in common. Many junction boxes are made to industry standard or to trade standard sizes. Earlier, junction boxes were generally constructed of metal and had only pre-formed knockouts for the attachment of conduits. When the electrician or installer found it necessary to have a hole for wire or conduit access to a junction box, this installer used a tool, such as either a punch or screwdriver, to remove a pre-formed knockout.

More recently, junction boxes have been constructed of plastics, or a mix of metals and plastics, and provide a wide variety of configurations for standard and for specialized uses. Conventional junction boxes which may be relevant to this invention include those set out in the following United States patents:

- 25 5,169,013, issued 8 December 1992, to Albert Lammens, Jr.;
5,216,203, issued 1 June 1993, to Edward E. Gower;
5,352,850, issued 4 October 1994, to Trevor W. Norris;
5,541,363, issued 30 July 1996, to Gary K. Weise, et al. (a named coinventor on the present application);
5,828,001, issued 27 October 1998, to Jan J. Schilhiam;
30 5,936,200, issued 10 August 1999, to Mike K. Park; and
5,942,726, issued 24 August 1999, to Kenneth Reiker.

A significant disadvantage of conventional junction boxes results from their comparative inflexibility of configuration, installation, size, expansion capability, and particularly, limitations with respect to inflexibility for routing and attachment of electrical conduits.

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Summary of the invention

In view of the deficiencies of the conventional related technology, it is an object of this invention to overcome one or more of these deficiencies.

This invention provides a molded non-conductive plastic junction box that has an interior volume which is larger than that of conventional junction boxes of the same exterior size. The 10 present inventive junction box has a back wall and four contiguous side walls, each joined both to the back wall and to its two contiguous side walls. The side walls are arranged in spaced apart opposite pairs and each side wall terminates at an end edge in a common plain with the other side walls to cooperatively define an opening into the box. This opening is used to insert components and wiring into the box and may be overlaid with a cover plate to provide a dry, 15 non-corrosive, and economical enclosure.

The junction box includes mounting lugs adjacent to this opening for securing a cover plate to the box as well as for securing at least one electrical component inside the box. These mounting lugs extend from the plane of the junction box opening toward but short of the back wall of the box in order to provide increased interior volume for the junction box. Also, the wall 20 portion of the junction box inwardly of the termination of these mounting lugs (i.e., toward the back wall of the box) provides additional wall space to which conduit sockets may be mounted, if desired.

The present inventive junction box body includes a unique insert member, which is receivable into an insert recess of the junction box, and which insert member defines one or more 25 conduit sockets at which conduits may be coupled to the junction box body. Thus, by using a certain size of junction box body, and having a variety of different sizes and configurations (i.e., single, or double conduit sockets, for example) of insert members, an installer is able to make at a job site a wide variety of different junction box assemblies. This combination of features results in a greater utility for the junction box combinations, reduced costs, and reduced storage

space and inventory size requirements for the inventive junction box assembly, when compared to those requirements for conventional junction boxes offering the same installation possibilities.

Accordingly, according to one embodiment, this invention provides an electrical junction box, this junction box comprising: a molded plastic junction box body including a back wall, and

5 plural contiguous walls extending generally perpendicularly to the back wall, and each one of the plural contiguous walls joining integrally to the back wall and also to adjacent ones of the plural contiguous walls to cooperatively define a chamber within the junction box, with the plural contiguous walls at respective end edges cooperatively forming an opening to the chamber; at least one wall of the junction box body defining an insert recess for slidably receiving an insert member which carries at least one conduit socket into which a termination portion of an 10 electrical conduit may be secured.

Other objects, features, and advantages of the present invention will be apparent to those skilled in the art from a consideration of the following detailed description of two exemplary preferred embodiments of the inventive junction box, when taken in conjunction with the appended drawing Figures. In these appended drawing Figures, features which are the same or which are analogous in structure or function are indicated by the same reference numeral throughout the several views.

Brief Description of the Drawing Figures

20 Figure 1 is a perspective view of a junction box assembly embodying the present invention with a junction box body having an insert member installed which defines a pair of adjacent conduit sockets;

Figure 2 provides a side elevation view, partly in cross section, of the junction box body and insert member seen in Figure 1, but these parts are shown at a preparatory stage of assembly;

25 Figure 2a shows the parts of the junction box assembly as seen in Figure 2, but with the parts assembled.

Figure 3 provides an end elevation view of the junction box seen in Figures 1 and 2, but without the insert member installed;

30 Figure 4 is a plan view of an insert member by itself, as may be used with the junction box body seen in Figures 1, 2, and 3;

Figure 5 is an end view of the insert member as seen in Figure 4;

Figure 6 is an end view of an insert member similar to the one seen in Figure 5, but providing a different size of conduit sockets;

Figure 7 is an exterior side elevation view of yet another alternative embodiment of insert member as may be used with the junction box body seen in Figure 1-3;

Figure 8 is an end elevation view of an insert member, taken from the side of this insert member opposite to the direction of view of Figures 5 and 6;

Figure 9 provides a perspective view similar to Figure 1, but illustrating an alternative embodiment of the inventive junction box assembly, including a junction box body and an insert member defining a single conduit socket;

Figure 10 is a perspective view of the bottom side of the junction box assembly seen in Figure 9, and illustrates the T-shaped recess;

Figure 11 is a fragmentary side elevation view, partly in cross section, of the junction box body seen in Figures 9 and 10, but is shown without the insert member installed;

Figure 12 provides a fragmentary plan view, partly in cross section, taken from the underside of a junction box body as is seen in Figure 9, and the direction of view is upwardly, showing the T-shaped recess;

Figures 13 and 14 illustrate two alternative embodiments of insert members, each having T-shaped insert portions, and each of which may be used with the junction box body seen in Figure 9;

Figure 15 provides an enlarged fragmentary view of an encircled portion of Figure 14;

Figure 16 is a fragmentary view taken at the line 16-16 of Figure 15, and looking in the direction of the arrows;

Figure 17 is a fragmentary elevation view, partially in cross section, and showing a step in the process of inserting a T-shaped insert member portion of an insert member as seen in Figure 14 into the T-shaped recess of a junction box body as seen in Figure 9;

Figure 18 is a fragmentary view similar to Figure 17, but shows the latching of the insert member into the junction box body by engagement of a latch member carried on the T-shaped portion of an insert member; and

Figure 19 provides a fragmentary plan view of a portion of the alternative embodiment of junction box, illustrating a provision for unlatching the insert member.

Detailed Description of Exemplary Preferred Embodiments of the Invention

Attention now to Figures 1-8 in conjunction, and viewing first Figure 1, will reveal a junction box assembly 10 embodying this present invention. This junction box assembly 10 provides a high-volume, high-utility, non-conductive enclosure (i.e., a junction box) for the placement of electrical components and wiring. In Figure 1 the junction box assembly 10 can be seen to include a junction box body 12, which is a chambered prismatic body formed of non-conductive plastic material. More particularly, the body 12 may preferably be injection molded of polyvinyl chloride (PVC), or of other thermoplastic or thermoset polymer materials known in the art. The body 12 includes a back wall 14, and plural (i.e., at least four) contiguous walls 16, 18, 20, and 22 which are generally perpendicular to the back wall 14. The contiguous walls 16-22 are joined integrally to the back wall 14, and are each also integrally joined to each of the two adjacent ones of the plural walls 16-22. Thus, these walls 16-22 are arranged in opposing pairs of generally parallel walls, and the adjacent walls are integrally joined to one another to form corner junctions 24, 26, 28, and 30.

Further to the above, the walls 16-22 are arranged in opposing generally parallel pairs so that they form a pair of side walls 16, 20; and a pair of end walls 18, 22. Each of the walls 16-22 has a respective termination edge or end edge 32-38, which end edges are all substantially in a common plane. The walls 14-22 of the junction box 10 cooperatively bound a cavity 40, and also cooperatively define an opening 42 to this cavity 40 within junction box 10. The end edges 32-38 circumscribe this opening 42. In other words, the opening 42 provides access to the cavity 40 formed within the junction box 10 by the cooperation of the back wall 14 and the side walls 16-22.

Turning now to consideration of Figures 1 and 2 in greater detail, it is seen that the junction box 10 also includes a plurality of inwardly extending ganged (or interconnected) mounting lugs generally indicated at 44. The use of these mounting lugs will be familiar to those ordinarily skilled in the pertinent arts. However, it is seen that these mounting lugs include a pair of center mounting lugs 46, 48 (one centered on each end wall 18, 22); and four side mounting

lugs 50a, 50b, 52a, and 52b (arranged two on each end wall 18, 22 adjacent to the corners of the box). Each of the mounting lugs 46-52b is connected to the other mounting lugs at that end of the junction box 10 by an integral web 54, and is cantilevered from a respective one of the end walls 18, 22, and/or from side walls 16, 20. Each mounting lug 44 is provided with at least one screw hole 56a, and also possibly with a guide hole 56b. Those ordinarily skilled in the art will recognize the screw holes 56a as being usable for securing an electrical component within the cavity 40, or for securing a cover plate at the opening 42. Moreover, the center mounting lugs 50, 52 are each also provided with a guide hole 56b, which by receiving a guide pin on a standard ground fault interrupter allows such an interrupter to be installed in a certain position 10 within the junction box 10.

As is seen in Figures 1 and 2, the mounting lugs 46-52b each extend from substantially the level of the opening 42 (i.e., substantially coplanar with the end edges 32-38) inwardly of the box (i.e., inwardly of cavity 40) toward the back wall 14. However, all of the mounting lugs 46-52b stop short of the back wall 14. That is, each of the mounting lugs 46-52 defines a respective termination surface 58, which is disposed toward but spaced from the interior surface of back wall 14. As a result, the termination surfaces 58 of mounting lugs 46-52b are all spaced away from the back wall 14 to better provide an increased interior volume for the junction box 10.

Provided on each side wall 16 and 20, is one of a pair of outwardly extending mounting ears, 60, only one of which is visible in the illustration of Figure 1. The mounting ears 60, each by providing for a screw to pass therethrough, allow the junction box assembly 10 to be secured to an underlying surface (not seen in the drawing Figures).

Further to the above, the end wall 18 closest to the viewer of Figure 1 defines a generally rectangular insert recess 62, best seen in Figures 2 and 3. This insert recess 62 is defined only in wall 18 according to the embodiment illustrated in Figure 1, although the invention is not so limited. In other words, in addition to or instead of the wall 18 defining an insert recess 62, any one or all of the other walls 16, 20, or 22 may define a similar insert recess. Further, the back wall 14 may even define an insert recess for receiving an insert member. The insert recess (or each of plural insert recesses) 62 receive an insert member, as will be explained further.

As is best seen in Figures 2 and 3, the insert recess 62 is generally rectangular in end elevation view (Figure 3) and includes a larger sized portion 62a, a smaller sized portion 62b,

and an outwardly disposed chamfered shoulder 62c defined by the cooperation of portions 62a and 62b. The portion 62b is defined by a peripheral flange 62d, which inwardly defines a latching surface 62e.

In Figure 1, an insert member 64 is shown received into the insert recess 62. This insert member defines at least one outwardly extending cylindrical protrusion or boss 66. The boss 66 defines a stepped cylindrical through bore 68, which is sized and configured to adhesively receive in an outer and larger diameter portion thereof an end portion of a plastic (i.e., PVC, perhaps) electrical conduit (not shown in the drawing Figures). That is, the cylindrical bore 68 at an outer part thereof provides an outwardly disposed conduit socket, also indicated with the numeral 68. As is seen in Figure 1, the insert member 64 may define a pair (or more) of conduit sockets in side-by-side relationship. It will be also understood that the insert member 64 may define only a single conduit socket, or none at all (in which case the insert member would simply be for closing the insert recess 62). Figures 5 and 6 illustrate that the bosses 66 may be separated and spaced apart (Figure 6); or that they may be larger, may define larger conduit sockets, and may be joined partially together (or be siamesed), as is seen in Figure 5.

As is best seen in Figures 2, 4, and 8, the insert member 64 has a rectangular body portion 64a, which is sized and shaped to be matchingly received into the insert recess 62. That is, as may be understood by a consideration of Figure 2, the rectangular body portion 64a of insert member 64 is receivable into the portion 62a of the recess 62. Insertion of the portion 64a of insert member 64 into the portion 62a of recess 62 is indicated in Figure 2 by the movement arrow 70. The body portion 64a is rectangular with two pairs of opposed spaced apart walls 72, 74, 76, and 78 (best seen in Figures 2, 4, and 8). These walls 72-78 preferably each carry and define a respective protruding integral latch portion 72a, 74a, 76a, and 78a. At each side of the latch portions 72a-78a, the walls 72-78 define one of a pair of notches or slots (each indicated with the numeral 80). The slots 80 provide for the latch portions 72a-78a to be sufficiently flexible that they can yieldably deflect slightly as the latch portion passes inwardly beyond the flange portion 62d, and allows the latch portions 72a-78a to spring outwardly in order to engage on the latching surface 62e, as is best seen in Figure 2a.

In view of the above, it will be appreciated that a user of the junction box body 12 and insert member 64 selects the particular insert member it is desired to use. This selection may be

made from among insert members that have various sizes of conduit sockets, viewing Figures 5 and 6, for example. The user then introduces the body portion 64a of the selected insert member 64 into the insert recess of a junction box body. The body portion 64a will slide freely into the insert recess portion 62a, until the latch portions 72a-78a encounter the chamfered surface 62c of the flange 62d. At that point, chamfered surfaces 72b-78b of the respective latch portions (best seen in Figure 2) confront and engage the chamfered surfaces 62c of the respective part of the flange 62d (i.e., at the particular portion of the flange 62d confronting a particular latching portion 72a-78a). The confrontation and engagement of these chamfered surfaces results (upon the application of an axial force by the user), and as is illustrated by force arrow 82 of Figure 2, in the latching portions 72a-78a deflecting sufficiently to allow them to pass inwardly beyond the flange 62d, after which these latching portions snap once again to their un-deflected position, and engage the flange 62d at surface 62e, as is seen in Figure 2a. The result is that the insert member 64 is securely retained in the recess 62 of the junction box body 12, creating a junction box assembly as is seen in Figure 1.

Figures 5 and 6 in contrast to one another illustrate that insert members may be provided with conduit sockets of differing sizes. Figure 7 shows that the insert members may be provided with a bosses or with bosses 66m and with a conduit socket 68 (or conduit sockets) that are offset in the elevation plane from the center line of the insert body portion 64a. This offset has the effect of moving the conduits received into these conduit sockets with respect to the surface upon which the junction box assembly 10 is mounted. Although the offset shown in the insert member of Figure 7 is with the conduit sockets offset downwardly, it will be understood that this insert member may be turned over and inserted with the conduit sockets offset upwardly. Thus, a user of the present inventive junction box has another choice and another degree of freedom resulting in a variety of configurations for the junction box. Further, the extent of such an offset of the boss(es) 66 and conduit socket(s) 68 may differ according to the wishes or requirements of a particular user of the junction box 10, and insert members 64 may be provided with configurations and offset dimensions embodying these differing offset requirements.

Turning now to Figures 9-19 taken in conjunction with one another, and viewing first Figure 9, an alternative embodiment of junction box assembly is shown. Because the embodiment of junction box assembly seen in Figures 9-19 has many features in common with

the embodiment of Figures 1-8, or features which are analogous in structure or function to those features illustrated and described above, those features are referenced on Figures 9-19 using the same numeral used above, and increased by either one-hundred (100), or by two-hundred (200).

Considering now Figure 9, it is seen that the junction box assembly 110 has a body 112, which 5 may preferably be injection molded of polyvinyl chloride (PVC), or of other thermoplastic or thermoset polymer materials known in the art. The body 112 includes a back wall 114, and plural contiguous walls 116, 118, 120, and 122. The contiguous walls 116-122 are joined integrally to the back wall 114, and are each also integrally joined to each of the two adjacent ones of the plural walls 116-122. Thus, these walls 116-122 are arranged in opposing pairs of 10 generally parallel walls, and the adjacent walls are integrally joined to one another to form corner junctions 124, 126, 128, and 130.

Each of the walls 116-122 has a respective termination edge or end edge 132-138, which end edges are all substantially in a common plane. The walls 114-122 of the junction box 110 cooperatively bound a cavity 140, and also cooperatively define an opening 142 to this cavity 15 140 within junction box 110. The end edges 132-138 circumscribe this opening 142. In other words, the opening 142 provides access to the cavity 140 formed within the junction box 110 by the cooperation of the back wall 114 and the side walls 116-122.

Turning now to consideration of Figures 9 and 10 in greater detail, it is seen that the junction box assembly 110 also includes a plurality of inwardly extending mounting lugs generally indicated at 144, and which are connected to the other mounting lugs at that end of the junction box 110 by an integral web 154, and are cantilevered from a respective one of the end walls 118, 122, and/or from side walls 116, 120. These mounting lugs are indicated with numerals 146-152b, and these define a respective termination surface 158, which is disposed toward but spaced from the interior surface of back wall 114.

Provided on each side wall 116 and 120, is one of a pair of outwardly extending mounting ears, 160, only one of which is visible in the illustration of Figure 9, and both of which are visible in Figure 10.

Further to the above, and viewing Figures 9 and 10 in conjunction with one another, it is seen that the end wall 118 closest to the viewer of Figures 9 and 10 defines a generally T-shaped 30 insert recess 162, which extends laterally of the length of the junction box body 112. That is, the

insert recess 162 is T-shaped and extends from the back surface of the junction box body (surface 112a as is seen in Figure 10) toward but short of the opening 142 into the cavity 140 of the body 112. This insert recess 162 is defined only in wall 118 according to the embodiment illustrated in Figures 9 and 10, although the invention is not so limited. Further, as is seen in Figures 9 and 5 10, in end elevation view of the body 112, the recess 162 presents a generally rectangular opening 162a. As is further seen in Figures 11 and 12, the insert recess 162 extends from the surface 112a toward but short of the opening 142, and includes a larger (i.e., of greater lateral extent) portion 162b, which includes an upper portion or tongue 162c extending upwardly beyond the top of the opening 162a. The portions 162a and 162b of the recess 162 present an 10 inwardly disposed shoulder 162d; and the portion 162b includes side surfaces 162e, which will be seen below to be usable as surfaces upon which a latching member may engage.

In Figures 9 and 10, an insert member 164 is shown received into the insert recess 162. This insert member defines at least one outwardly extending cylindrical protrusion or boss 166. The boss 166 defines a stepped cylindrical bore 168, which is sized and configured to adhesively receive an end portion of a plastic (i.e., PVC, perhaps) electrical conduit (not seen in the drawing 15 Figures). Thus, the cylindrical bore 168 provides an outwardly disposed conduit socket, also indicated with the numeral 168. Again, as is seen in Figure 1, any of the insert members used in conjunction with a junction box body of this invention in order to make a junction box assembly may define a pair (or more) of conduit sockets in side-by-side or other relationship. It will be 20 also understood that the insert member 164 may define only a single conduit socket, or none at all (in which case the insert member would simply be for closing the insert recess 162).

Now, as is best seen in Figures 9, 10, and 13, the insert member 164 has a generally rectangular body portion (generally referenced with the numeral 164a), which is of T-shape in plan view (i.e., either from the top or bottom plan view), and which is sized and shaped to be 25 slidably and matchingly received into the insert recess 162. That is, as may be understood by a consideration of Figures 10 and 13, the rectangular body portion 164a of insert member 164 includes a flange portion 164b, and a larger flange portion 164c, and these flange portions are slidably receivable into the portions 162a and 162b of the recess 162, as is indicated by the movement arrow 170 of Figure 10. Considering for a moment an alternative embodiment of the 30 invention, it is seen that insertion and latching of the portion 264a of insert member 264 into the

portions 162a and 162b of a recess 162 is indicated also in Figure 17 and 18 by the movement arrows 170 (in those Figures indicating relative movement by the use of opposed arrows). The embodiment of the insert member seen in Figures 17 and 18 includes a latching feature, which will be further described.

5 But, continuing with a consideration of Figures 9 and 10, it will be understood that an embodiment of insert member 164 as is seen in Figure 13 may be adhesively secured into the recess 162. This is done by applying an adhesive to the protruding side and upper parts of the flange portion 164c immediately prior to sliding the insert member into the recess 162. Viewing Figure 13 it is apparent that the insert member 164 enjoys a symmetry about a horizontal line, so
10 that the insert member may be inserted with either side "up" in the recess 162. The installer simply coats the side portions of the flange part 164c, and which ever part of flange part 164c is to go first into the recess 162, and slides the insert member into the recess 162. The adhesive coated "top" portion of the flange part 164c will go into the tongue part 162c of the recess 162. When this adhesive sets, the insert member 164 is secured permanently in the recess 162.

15 On the other hand, an embodiment of insert member 264 as is seen in Figure 14 may be simply slid into the recess 162, and will self-latch into this recess, as is further explained below. Further, provided that the junction box body 112 is provided with release features to be explained below (which release features are optional), then the insert member may also be removed in the event, for example, that the installer changes his plan for a particular installation and wants to use
20 an insert member with different sizes or a different number of conduit sockets on a particular junction box body.

Viewing now the insert member 264 seen in Figure 14, is first seen that this insert member is substantially the same as the insert member 164 seen in Figure 13, with two important differences. First, the insert member 264 is provided with indicia 84 indicating the "top" of this insert member (that is, the side to be inserted first into the recess 162 of a junction box body 112). These indicia may include one or more words, such as the word, "TOP," which may be molded into the flange portion 264c. Also, the indicia 84 may include one or more arrows molded onto the flange portion 264b. By use of these indicia 84, the user of the insert member 264 knows how to place this insert member into the recess 264 of a junction box body 112. The
30 second difference with the insert member 264 is that this insert member is provided with a pair of

latching structures, each generally indicated with the numeral 86. Further, between the "top" edge of the flange portion 264c, and the latching structures 86, the flange 264c defines a half-round recess or groove 264d extending along this flange portion.

Turning now to Figures 15-18, and first considering Figure 15, it is seen that the latching structure 86 includes a "keyhole" shaped recess or hole 88 formed in the flange portion 264c of the insert member 264. This recess 88 includes an upper wall 90 which is preferably perpendicular to the side edge of the insert member. The wall 90 is opposed by a wall 92, which is angulated relative to the wall 90, and to the side edge of the insert member 264. The walls 90 and 92 are connected by a rounded portion 94 of the recess 88. Further, a transition surface 96 joins the rounded portion 94 with the angulated wall portion 92. Within this recess 88 is received a metallic latching member 98, which is preferably formed of spring steel flat stock or strip stock. This latching member 98 has a free or undistorted shape which is somewhat larger than the recess 88, so that the latching member 98 is forcefully distorted or sprung into the recess 88 to be retained therein by its own spring force. The latching member 98 includes a longer leg 100 which lies adjacent to wall 90, and which terminates in a protruding tooth portion 102. Latching member 98 also includes a rounded portion 104, which is received into rounded portion 94 of the recess 88, and a reentrant portion 106 that embraces transition surface 96 in order to secure the latching member 98 in recess 88.

As is seen in Figure 17, when the insert member 264 is slid into the recess 162 of a junction box body 112, the tooth portion 102 slides along the surface 162e of the recess 162, allowing the insert member to slide into this recess. Figure 18 shows the relative position of the insert member 264 and the recess 162 of a junction box body 112 after the insert member has reached full insertion into the recess 162. At that point, the user of the junction box 110 applies a withdrawing force 108 to the insert member, which results in the insert member 264 moving only slightly outwardly of the recess 162, upon which the tooth 102 digs into the surface 162e. The tooth 102 thus becomes embedded in surface 162e and permanently retains the insert member 264 in the recess 162 without the use of adhesives. Adhesive may be used with the insert member 264, however, in the event that additional securing or sealing of the insert member 264 in recess 162 is desired.

However, the junction box body 112 may also be provided with optional features allowing the insert member 264 to be removed from recess 162. Importantly, as will be seen, these "release" features allowing the insert member 264 to be withdrawn from the recess 162 are only accessible from within the cavity of the junction box assembly 110, so that there is no risk of the insert member 264 inadvertently being released from the junction box assembly. Further, as will be seen, releasing the insert member 264 from the junction box body 112 requires use of a couple of special "tools," as well as the application of deliberate action.

Considering now Figures 11, 12, 18, and 19, with attention first to Figure 19, it is seen that the junction box body 112 may define a pair of holes 310 (only one of which is seen in Figure 19) each opening from within the cavity 140 of the junction box to a respective end of the recess 162. These holes 310 align with and open to a pair of half-round vertical grooves 312 extending entirely along the surface 162e of the recess 162 (best seen in Figures 11 and 12). The groove 312 aligns with groove 264d, and these grooves cooperatively form a passage or hole extending to the tooth 102 of the latching member 98.

As can be appreciated by viewing Figure 18, with the tooth 102 in the latching position shown (i.e., embedded in surface 162e), if a user of the junction box assembly 110 inserts a long thin pin drift, or a long piece of stiff wire through each of the holes 310 (i.e., two pin drifts or two pieces of wire are required) and along the grooves 312/264d (as is indicated by arrow 314 in Figure 18), then this pin drift or wire can be used (possibly along with a slight upward movement of the insert member 164) to cooperatively force the tooth 102 out of its latching position and back to the position seen in Figure 17 in which the tooth is not engaged with surface 162e. With the two latching teeth 102 of each of the two latching structures 86 so disengaged from the junction box body 112, the insert member 264 can be slid out of the recess 162.

But, it will be understood that the deliberate action (i.e., maintenance of the withdrawing force on the pair of pin drifts or on the pair of wire pieces, as well as coordinated movement of the insert member 264 out of recess 162, must be maintained entirely along the length of movement of the insert member 264 out of insert recess 162. This is the case because the latching members 98 are resilient spring steel parts and strongly urge the teeth 102 toward engagement with the junction box body 112. Thus, the insert member 264 is not removed from the body 112 except by deliberate action. However, by knowing and deliberate action, the user

of a junction box assembly 110 using the insert member 264 as illustrated, and a junction box body 112 which is provided with the optional "release" features (Figures 11, 12, and 17-19) may remove the insert member 264 from insert recess 162 of the body 112. After the insert member is thus removed from the insert recess 162, it may be replaced by another insert member of a 5 different configuration, if that is desired.

Those skilled in the art will further appreciate that the present invention may be embodied in other specific forms without departing from the spirit or central attributes thereof. Because the foregoing description of the present invention discloses only particularly preferred exemplary embodiments of the invention, it is to be understood that other variations are recognized as being 10 within the scope of the present invention. Accordingly, the present invention is not limited to the particular embodiment which has been described in detail herein. Rather, reference should be made to the appended claims to define the scope and content of the present invention.